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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,703	07/11/2006	Stefan Bitterlich	13156-00063-US	4349

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EXAMINER

FORTUNA, ANA M

ART UNIT	PAPER NUMBER
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1797

MAIL DATE	DELIVERY MODE
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06/24/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/585,703

**Applicant(s)**

BITTERLICH ET AL.

**Examiner**

ANA M. FORTUNA

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 July 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 12-16 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☒ Claim(s) 4-6 is/are allowed.  
6) ☒ Claim(s) 1-3, 7-9 and 12-16 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 7/11/06  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

**DETAILED ACTIO**

***Claim Rejections - 35 USC § 112***

1. Claims 13-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 13, directed to a process of using is depending on a process of making a membrane (claim 4), the claim is unclear as to the claim is intended to be depending on claim 1, the membrane claim. Dependent claims 14-16 are also rejected as depending on claim 13.

***Claim Rejections - 35 USC § 103***

2. Claims 1, 2, 3, 7, 8, 9, 12, 13, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. US 7,252,876, in view of Tsaptsis et al. US 7,357,836. Claim is directed to a composite membrane having a zeolite of MFI type with a molar ratio of silicone to aluminum greater than 120 on a support and less than 10% by weight of aluminum on the support (the term less than 10% includes zero as lower range). Mori et al disclose a composite membrane with a layer of MFI type zeolite with a silicon/aluminum ratio of 10 to 100, and further discloses support membranes with the a silicon aluminum ratio of from 20-400, and further teaches producing a composite membrane from a sol having a si/aluminum ( $\text{SiO}_2/\text{Al}_2\text{O}_3$ ) ratio 40 to 150 (abstract, column 3, lines 26-59; column 3, lines 11-34; and column 4, lines 65-column 5, line 31). On third paragraph of column 5, Mori et al teach producing a coating on a support to form a composite membrane, by immersing the substrate (support) on a sol for membrane formulation having a  $\text{SiO}_2/\text{Al}_2\text{O}_3$  of 40 to 150, forming a layer of MFI

membrane. The substrate meets the low aluminum content required in claim 1, because the silica to aluminum ratio on the support is at a ratio of 400, as discussed above. Support material with a ratio of silica to aluminum of 500 or more are also suggested (column 6, lines 50-54). Mori et al fails to suggest or disclose the substrate as asymmetric substrate or support, the substrate is disclosed as porous (however, teaches the substrate as porous (abstract, column 6, lines39-54).

Tsapatzis et al (patent '836) teach a composite zeolite membrane on porous support (abstract and Fig.), the zeolite has an MFI framework and contains silicone and aluminum (column 3, third paragraph; and column 6 through column 7, line 62); the membrane is formed on a support, and the support is disclosed as porous and made from ceramic, organic material, such as Teflon, metal such as stainless steel, etc (column 7, line 50 through column 8, line 44). The pore selection of the substrate in patent '836 is based on the specific used, the pores range from 10 to 5000 nanometers (column 9, second paragraph); the substrates can also be composite, e.g with a second layer of lower pores deposited on the substrate (column 9, lines 20-31). Based on this suggestions, the skilled artisan would have been motivated to use the materials suggested for the membrane of Mori et al, and would have been further motivated to use supports with variable pore size through the membrane thickness, or asymmetric, because of the porous composite with lower pore size at the membrane surface as compared to the larger pore size on the lower surface, as suggested in this patent.

Regarding claim 8, patent '836 suggests selecting a coating of smaller pores to prevent the framework (zeolite MFI type) from entering the substrate (column 8, lines

29-31). It would have been obvious to one skilled in the art at the time this invention was made to select the pores on the substrate depending of the final product desired for a particular application, as suggested in '836.

Claim 3 is covered in the discussion of patent '836.

As to claim 7, the membrane use is disclosed in patent to Mori et al, e.g. separation of butane isomers (column 8, second paragraph) and hydrocarbon and isomers of hydrocarbon separation ( see patent '836, column 13 last paragraph, bridging column 14). It would have been obvious to one skilled in this art at the time the invention was made to predict the separation of the particular isomers or hydrocarbon mixtures with a zeolite membrane of MFI type, base on the prior art suggestions.

Regarding claims 8, 9, performing the process at temperatures of 200 degree C (column 8, line 3-44). The pressure in the feed side of the membrane is inherently at a higher pressure, due to the feed pressure to drive the mixture to the membrane and further due to the high temperature in the feed side. As to claims 12 and 16, the separation of isomeric butenes can be predicted by the skilled in the art based on the membrane layer properties and porous support material. Claims 13-15 are considered as dependent on claim 1, and their limitations are discussed above.

***Allowable Subject Matter***

Claims 4-6 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the process of making the membrane including steps of drying and calcination

at the claimed conditions is not suggested in the prior art of record for the membrane as whole.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANA M. FORTUNA whose telephone number is (571)272-1141. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KIM VICKIE can be reached on 571-2720479. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANA M FORTUNA/  
Primary Examiner, Art Unit, 1797